
Sneak Peek: The 2015 Virginia Healthcare-Associated Infections (HAI) Annual Report



Presented By:
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Good afternoon and welcome to a Sneak Peek of the 2015 Virginia Healthcare-Associated Infections Annual Report.

I'm Sarah Lineberger, the HAI Epidemiologist at the Virginia Department of Health, and with me is Mefruz Haque, our CDC/CSTE Applied Epidemiology Fellow.

We will be going back and forth as we share information with you today.

Objectives

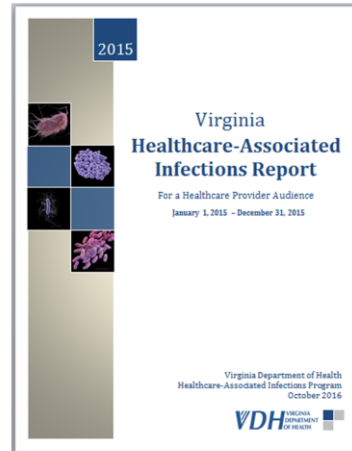
- Why? Why now?
- Describe structure of the annual report
 - Methods
 - Results
- Review available resources
 - Frequently asked questions

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Today we want to talk about why we did this report, give you an idea of what's in the report (because at 124 pages it is lengthy), and talk about resources you can use if you need to present data or answer questions about the report.

Overview: 2015 HAI Annual Report

- Summary of all HAI data reportable to VDH in 2015
 - Via the **National Healthcare Safety Network (NHSN)**
 - Hospitals (acute and critical access)
 - January 1 – December 31, 2015
- 2 versions:
 - Healthcare Provider
 - Healthcare Consumer
- Includes hospital-specific data, fact sheets and educational materials



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In a nutshell, the report is a summary of all the HAI data that was reportable to VDH from hospitals in calendar year 2015. All the data in the report was submitted by the hospitals through NHSN, the National Healthcare Safety Network.

There are 2 versions of the report, one for providers and one for consumers, and we will be pointing out some content differences between the two versions.

There is a lot of information in the report beyond just the data, so we're going to direct you to some of those resources.

Purpose: 2015 HAI Annual Report

For calendar year 2015:

- Enable readers to view hospital-specific HAI performance
- Understand Virginia's HAI performance as a whole
- Compare a hospital's HAI performance to that of the rest of the country
- Share healthcare worker influenza vaccination rates
- Present retrospective data not previously published by VDH

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The purpose of this report is to enable readers to view the performance of their hospital with regards to HAIs in 2015. The goal of the report was not to rank hospitals but to understand Virginia's HAI performance as a whole, as well as to compare each hospital's performance to that of the rest of the country using national baselines.

The measures presented in the report do not represent all possible HAIs. They were selected by the federal government and VDH because they give a good overview of how a hospital is doing in preventing HAIs. **HAIs are largely preventable when healthcare providers use recommended infection prevention steps.**

With this report we also wanted to share healthcare worker influenza vaccination rates for Virginia and at the individual hospital level. **It is recommended by CDC and VDH that all personnel who work in a healthcare setting receive the influenza vaccine each year to protect patients and staff.**

The report also contains some retrospective data, and I'm going to talk more about that on the next slide.

History of VDH HAI Reports

VDH reports have followed regulation changes:

- CLABSI since July 2008 – adult intensive care units
 - CLABSI quarterly reports 2008-2011
 - <http://www.vdh.virginia.gov/surveillance-and-investigation/healthcare-associated-infections-hais/central-line-associated-bloodstream-infections-clabsi-data/>
- Alignment with CMS Hospital Inpatient Quality Reporting Program since September 2015
 - Data retrospectively and prospectively
 - New annual report
 - Based on the CSTE HAI Data Analysis and Presentation Standardization Toolkit

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CLABSIs have been reportable to VDH since July 2008 for adult intensive care units. From 2008 through 2011, the VDH HAI program produced quarterly CLABSI reports, and those can be found on our website.

In September 2015, the Regulations for Disease Reporting and Control were updated to align state HAI reporting requirements with those of the Centers for Medicare and Medicaid Services Hospital Inpatient Quality Reporting Program. That means that last fall, VDH received all the data hospitals had been reporting to CMS over the last several years, as well as prospective data. This new annual report now covers all the data we're getting, and we included some of the retrospective data because VDH hasn't previously published it.

This report is based on national guidelines laid out in the CSTE HAI Data Analysis and Presentation Standardization Toolkit.

Data Reported to VDH

HAI Event	Applicable Units	Reporting Start Date
CLABSIs	Adult, pediatric, and neonatal ICUs	July 2008
	Adult and pediatric medical, surgical and medical/surgical inpatient wards	January 2015
CAUTIs	Adult, pediatric, and neonatal ICUs	January 2012
	Adult and pediatric medical, surgical and medical/surgical inpatient wards	January 2015
SSIs following colon procedures	Inpatient Procedures	January 2012
SSIs following abdominal hysterectomies	Inpatient Procedures	January 2012
MRSA Bacteremia LabID Events	Facility wide inpatients including ED, 24 hour observation	January 2013
<i>C. Difficile</i> LabID Events	Facility wide inpatients including ED, 24 hour observation	January 2013
Healthcare Personnel Flu Vaccination	All inpatient healthcare personnel	January 2013

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This chart describes the type of data that we receive from hospitals and they also report all this data to CMS. To understand what data we've gotten retrospectively, see the reporting start date column.

Report Sections

- Executive Summary
- Background
- Methods
- Results
- Conclusions
- Acknowledgements
- Appendices
 - Fact Sheets, Educational Materials
 - Hospital Characteristics
 - More data: historic, unit-specific, alternative SSI model
 - Definitions, References

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This slide directs you to the Table of Contents, and the sections included in the report. We will be reviewing Methods and Results by infection type today, as well as pointing out resources available in the appendices.

Two Versions

Healthcare Provider (see also)	Healthcare Consumer
Appendix B: What Providers Can Do To Prevent Infections	Appendix A: Fast Facts about HAIs
Appendix C: Hospital Characteristics (by hospital)	Appendix C: Things to Think About When Choosing a Healthcare Facility
Appendix F: Summary of HAIs in VA 2013, 2014	Appendix D: What Patients Can Do To Help Prevent Infections
Appendix G: Device-Associated Data, VA, 2011-2015	
Appendix H: Unit-Specific Device-Associated Infection Tables	
Appendix I: Hospital-Specific SSI Data, 30-day SSI Model	
Appendix J: References	

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As I said, there are 2 versions of the report. The data in the body of the report is essentially the same in both versions, with plainer language and less detail in the consumer version.

The resources in the appendices differ significantly between the two versions. The consumer version has some really nice fact sheets that are geared towards consumers and that could be used as stand alone resources or to adapt for your own resources.

The appendices in the provider version include a lot more additional data, including some historic data, device-associated data stratified by unit type, SSI data using a different model (which we will discuss in more detail), as well as references and a fact sheet for providers.

Throughout the rest of the presentation, we will refer you to the appendices for more information, and that will be in red text.



Overall Methods



Really quickly, because we have a mixed audience, we'll talk about some overall methods.

Standardized Infection Ratio (SIR)

$$SIR = \frac{\text{Number of Observed Infections}}{\text{Number of Predicted Infections}}$$

- SIR is a summary measure that can be calculated at the national, state, facility, or unit level
 - Adjusts for differences between hospitals (e.g., bedsize, teaching affiliation)
 - Can be used to track HAIs over time
- Lower SIR indicates better performance
- Interpreting the SIR:
 - An SIR **less than 1.0** indicates fewer infections reported than would have been predicted.
 - An SIR **equal to 1.0** indicates that the number of infections reported is the same as the number of infections predicted.
 - An SIR **greater than 1.0** indicates that there were more infections reported than predicted.
- An SIR is **not calculated** if the number of predicted infections is **less than 1.0**
 - No Conclusion

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The SIR, or Standardized Infection Ratio, is the number of observed infections in a specified time period over the number of infections that were predicted to occur in a facility, based on the national experience during the baseline time period.

The SIR is a risk-adjusted measure. We will not be getting into the details of the risk adjustment in this presentation, but there are more details in the methods section of the report.

Standardized Infection Ratio (cont.)

- The **lower bound of the 95% Confidence Interval (CI)** of the SIR will not be calculated if the number of **observed infections is zero (0)**
 - Confidence Interval is N/A
- **Interpretation:** SIR 95% Confidence Interval
 - Statistically significant difference?
 - Statistically different than baseline: **Better** or **Worse**
 - Not statistically different from baseline: **Same**

Legend			
★ Fewer infections (better) than predicted based on the national experience.	= About the same number of infections as predicted based on the national experience.	✗ More infections (worse) than predicted based on the national experience.	No Conclusion When the number of predicted infections is less than 1, no conclusion can be made.

- Zero infections does not mean that the hospital failed to report any infections

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The report presents the SIR, and the interpretation of the SIR compared to the national baseline. The 95% Confidence Interval was used to determine statistical significance.

If the SIR is statistically different than the baseline, than it is labeled as either better or worse. Better if there were fewer infections than predicted (in other words the SIR is less than 1), and worse if there were more infections than predicted (in other words, the SIR is greater than 1). If the SIR is not statistically different than the baseline (in other words, the Confidence Interval crosses 1), than the SIR is considered to show about the same number of infections as predicted.

The legend shown on this slide is used consistently throughout the report.

Reading Guide for HAI Data Tables

This column is only shown in tables summarizing LabID events (i.e., MRSA & C. difficile)

Observed = Number of infections (or events) identified
 Predicted = Number of infections (or events) predicted based on NHSN national baseline data

Standardized Infection Ratio (SIR):
 SIR = Number of infections observed / Number of infections predicted
 SIR = 1.5 means 50% more infections than predicted
 SIR = 0.5 means 50% fewer infections than predicted

Statewide aggregate data are found in the first row.

Hospital Name	Months Included	Device Days/ No. of Procedures/ Patient Days	Number of Infections		SIR and 95% Confidence Interval		SIR Interpretation
			Observed	Predicted	SIR	95% CI (lower, upper)	
All Virginia Hospitals	12	447,204	411	783.62	0.52	(0.48, 0.58)	★ Better
Hospital A	12	1,270	2	1.72	1.16	(0.19, 3.84)	= Same
Hospital B	9	1,794	0	3.08	0.51	(0.41, 0.54)	★ Better
Hospital C	12	374	0	0.60	N/A	N/A	No Conclusion
Hospital D	12	3,659	11	5.07	2.17	(1.14, 3.77)	✖ Worse

Example: Hospital A

Device Days	Obs.	Pred.	SIR	95% CI	Interpretation
1,270	2	1.72	1.16	(0.19, 3.84)	= Same

Hospital A reported:

- 1,270 denominator days
- Observed 2 infections
- Predicted 1.72 infections

Hospital A SIR:

- Not statistically significantly different from baseline SIR of 1 (CI crosses 1.0).
- 16% more infections than predicted.

Legend

★ Fewer infections (better) than predicted based on the national experience.	= About the same number of infections as predicted based on the national experience.	✖ More infections (worse) than predicted based on the national experience.	No Conclusion When the number of predicted infections is less than 1, no conclusion can be made.
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This reading guide is a screenshot from the healthcare provider version, and represents the layout of the data tables found throughout the report.

Each HAI infection type (such as CLABSIs, SSIs) has a section with corresponding data tables.

Each data table will include a line for each hospital, the corresponding denominator value (i.e., device days or number of procedures performed), the number of infections observed in that facility, the number of infections predicted for that facility, the SIR, and the interpretation of the SIR.

Note that the top row is for all Virginia hospitals; the statewide total row is found consistently throughout the report.

Variable Definitions

- **Months Included:** Number of months included in the SIR calculation
- **Denominator (total for 2015):**
 - **Number of Procedures:** Number of surgeries performed by a facility
 - **Device Days:** Number of device days that were reported for device-associated infections
 - **Patient Days:** Daily count of the number of patients in a patient care location
- **Observed Infections:** Number of infections (or events) that were reported
- **Predicted Infections:** Calculated value that reflects the number of infections that were predicted to occur in a facility, based on the national experience during the baseline time period.

See also: Appendix E

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Here are some variable definitions, and there is a more extensive list in Appendix E. The denominator is dependent on the type of infection you are looking at, for example, for surgeries, the denominator would be number of procedures.

Data Caveats: Things To Keep in Mind

- Don't look just at the SIR – consider number of procedures performed, or infections observed
- NHSN definition changes*
- Old national baselines*
- Patient-level risks not adjusted for in most models*
- Facility-level risk differences may not be fully accounted for
- Possible variations in interpretation and application of NHSN criteria
- Possible variations between results published by VDH and results published elsewhere (e.g., CMS Hospital Compare)
- Primary purpose of this report is not to track hospital performance over time
- Retrospective data: Data prior to 2014 has not been quality-assured by VDH

*See slide 51

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As you know, the NHSN surveillance definitions aren't perfect.

The data presented in this report is based on old national baselines, and there have been many surveillance definition changes since the baselines were updated. The system only collects a limited amount of patient-level data, thus the risk-adjustment isn't perfect.

We go into these data limitations in the methods section. Keep in mind that the primary purpose of this report is not to track hospital performance over time, but to compare each hospital and the state against national benchmarks.



Let's discuss some statewide results.

Virginia Hospital Characteristics

Volume:

- 3,000,000 patient days
- > 15,000 inpatient beds

See also: Appendix C, D

Table 2	Number of Hospitals	Percent
Total Virginia	81	-
Hospital Type		
Acute Care	78	96.3%
Critical Access	3	3.7%
Region		
Central	16	19.7%
Eastern	18	22.2%
Northern	10	12.3%
Northwest	13	16.0%
Southwest	24	29.6%
Total Number of Beds		
≤100	31	38.3%
101-200	24	29.6%
> 200	26	32.1%
Medical School Affiliation		
Yes	37	45.7%
No	44	54.3%

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Table 2 of the report presents some statewide descriptive variables for the hospitals in our state. The report covers 81 hospitals, with 96% of those being acute care, and 4% critical access hospitals. This report does not contain data for military, long-term acute care, children's, inpatient psych, or inpatient rehab hospitals. In total, the hospitals in the report represent over 3,000,000 patient days annually, representing more than 15,000 inpatient beds.

There are 5 surveillance regions in our state, and you can see there are differences in pure number of hospitals by region, with the Southwest region having the largest percentage of hospitals.

Looking at bedsize, there is a fairly even percentage of small, medium, and large hospitals in the state if you use the cut-points shown on the slide.

46% of hospitals in Virginia have some sort of teaching affiliation with medical or residency students.

In Appendix C these characteristics are listed by hospital, and Appendix D contains a map that shows the 5 regions of the state.

Table 3. SIRs, Virginia Hospitals, 2015

HAI	Unit/Type	No. of Facilities	Device Days/ Procedures Performed/ Patient Days	Number of Infections		Standardized Infection Ratio (SIR)* and 95% CI		
				Observed	Predicted	SIR	Lower	Upper
CLABSI	All ICUs and Wards (total)	81	447,204	411	783.62	0.52	0.48	0.58
	Adult and Pediatric ICUs (only)	78	197,508	203	394.00	0.52	0.45	0.59
	Adult and Pediatric Wards (only)	81	218,643	177	318.83	0.56	0.48	0.64
	Neonatal ICUs (only)	25	31,053	31	70.80	0.44	0.30	0.61
CAUTI	All ICUs and Wards (total)	81	464,584	510	877.65	0.58	0.53	0.63
	Adult and Pediatric ICUs (only)	78	231,684	319	472.65	0.68	0.60	0.75
	Adult and Pediatric Wards (only)	81	232,900	191	404.99	0.47	0.41	0.54
SSI*	Colon Surgery	77	7,158	226	221.03	1.02	0.90	1.16
	Abdominal Hysterectomy	68	8,384	84	67.61	1.24	1.00	1.53
MRSA	Facility-wide LabID	81	3,475,556	178	207.84	0.86	0.74	0.99
CDI	Facility-wide LabID	81	3,153,506	2,542	2556.14	0.99	0.96	1.03

Green highlighting indicates an SIR significantly lower than the national baseline.
Red highlighting indicates an SIR significantly higher than the national baseline.

See also: Appendix F

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Table 3 presents statewide SIRs for each type of infection, and we would encourage you to use this table as a reference.

Appendix F displays the same data, with a table for 2014, and a table for 2013.

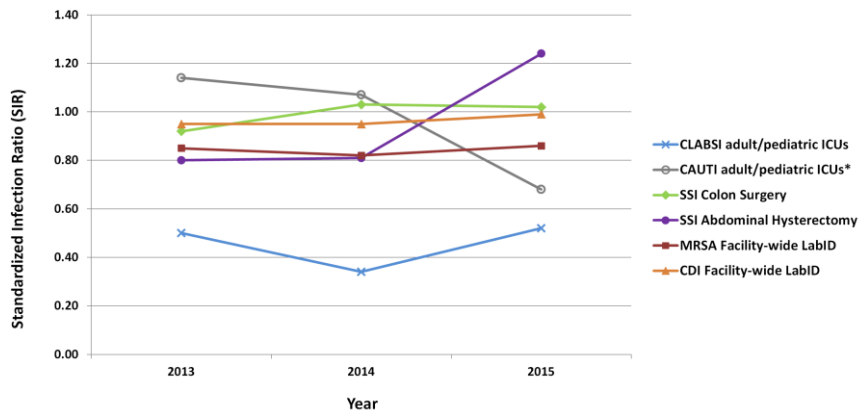
Table 4. Infections In Virginia Compared To The National Experience, Virginia Hospitals, 2015

Legend						
★ Fewer infections (better) than predicted based on the national experience*.	= About the same number of infections as predicted based on the national experience.*	✗ More infections (worse) than predicted based on the national experience.*	No Conclusion	When the number of predicted infections is less than 1, no conclusion can be made.	N/A	Hospital did not perform that surgical procedure or had no eligible procedures** in 2015
*National experience contains data from 2006-2008 for CLABSI and SSI, 2009 for CAUTI, and 2010-2011 for MRSA and <i>C. difficile</i> Laboratory-identified Events. **Eligible procedures are those that fit the Complex Admission/Readmission SSI model.						
Table 4. Infections in Virginia Compared to the National Experience, Virginia Hospitals, 2015						
Hospital Name	Bloodstream Infections (CLABSIs)*	Urinary Tract Infections (CAUTIs)*	Surgical Site Infections (SSIs) from Colon Surgeries	SSIs from Abdominal Hysterectomies	Methicillin-Resistant <i>Staphylococcus aureus</i> (MRSA) Bacteremia LabID Events	<i>Clostridium difficile</i> LabID Events
All Virginia Hospitals (n=81)	★	★	=	✗	★	=

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Table 4 has a row for each hospital and the interpretation of how they're doing for all the HAIs covered in this report. For example, at the statewide level, Virginia hospitals are doing better than predicted based on the national baseline for CLABSIs, CAUTIs, and MRSA bacteremia LabID events, represented by the green stars. The state is doing the same as predicted for SSIs following colon surgeries, and for C diff LabID events. The state is doing worse than predicted based on the national experience for SSIs following abdominal hysterectomies.

Figure 1. Statewide SIRs by Infection Type, Virginia, 2013-2015



This graph shows SIRs by infection type at the statewide level over the last 3 years.

Note that the device-associated data on this graph and in the CLABSI and CAUTI graphs that Mefruz will be presenting only include ICU data and not ward-level data for consistency because ward level data was not reported until 2015.



Central Line Associated Bloodstream Infections (CLABSI)



I will be describing the methodology and the results for each of the infections that we have included in the report. We will begin with central-line associated bloodstream infections.

Methods: CLABSI

- Reporting Requirements
 - Adult intensive-care units: July 2008
 - Pediatric and neonatal intensive-care units: January 2011
 - Adult and pediatric medical, surgical, and medical/surgical wards: January 2015
- National Baseline: 2006-2008
- Device-associated and unit-specific
 - **See also: Appendix H**
- Pediatric surgical ward data were excluded from national baselines and device-associated SIR calculations in this report

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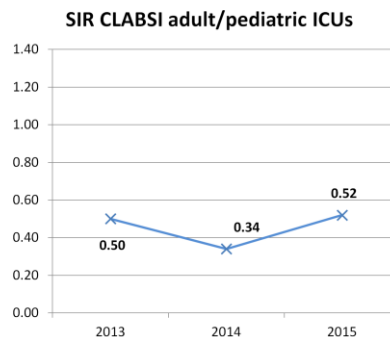
As previously mentioned, CLABSIs were the first HAI reported to VDH via NHSN. CLABSI data from adult ICUs have been reportable since July 2008. Since then different units have been added as part of the CLABSI reporting requirements.

The national baseline for CLABSI is 2006-2008. The SIRs for CLABSI data were adjusted for risk factors associated with device-associated infections. Though this report focuses on hospital level data we have also included data stratified by intensive care units and non-intensive care units in the appendices of the technical report. This data can be found in Appendix H or pages 91-112.

Pediatric surgical ward data were excluded from the national baselines and device-associated SIR calculations.

Results: CLABSI

- In 2015, there were 48% fewer CLABSIs in Virginia hospitals than predicted - total
- 2015 SIR was 0.52 (95% CI: 0.48, 0.58) - total
- Although SIR was below baseline, the SIR increased in 2015 compared to previous years



See also: **Appendix G**

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In 2015, there were 48% fewer CLABSIs in Virginia hospitals than predicted based on the 2006-2008 baseline.

Nearly half of Virginia hospitals reported zero CLABSIs in their ICUs and inpatient wards and 23 hospitals experienced a significant reduction from the national baseline.

Although, the SIR for CLABSIs have remained significantly lower than the baseline over the past five years, it should be noted that the 2015 SIR was increased compared to previous years.

Additional retrospective CLABSI data can be found in Appendix G.



Catheter-Associated Urinary Tract Infections (CAUTI)



Moving on to Catheter-Associated Urinary Tract infections.

Methods: CAUTI

- Reporting Requirements:
 - Adult and pediatric intensive-care unit: January 2012
 - Adult and pediatric medical, surgical, and medical/surgical wards: January 2015
- National Baseline: 2009
- Pediatric surgical ward data were excluded from the national baseline and device-associated SIR calculations in this report.
- NHSN surveillance definition change in January 2015
 - Excludes fungal organisms (yeasts and molds) because clinically determined to be associated with colonization and is not considered true UTI

See also: Appendix H

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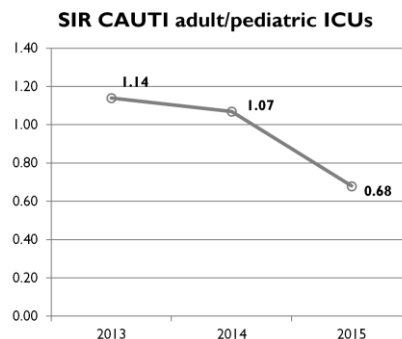
CAUTI data has been reportable to VDH since 2012. The national baseline for CAUTI is 2009.

Like CLABSIs, CAUTI SIRs were adjusted for risk factors associated with device-associated infections. SIRs stratified by intensive care or non-intensive care unit for CAUTIs are also available in Appendix H. Once again pediatric surgical ward data were excluded from the national baseline and SIR calculations in this report.

An important note for CAUTI is that the NHSN surveillance definition changed in 2015. The change now excludes fungal organisms such as yeasts and molds from the CAUTI definition as it is associated with colonization and thus is not a true UTI.

Results: CAUTI

- In 2015, there were 42% fewer CAUTIs in Virginia hospitals than predicted - total
- SIR was 0.58 (95% CI: 0.53, 0.63) - total
- 2015 decrease attributed to NHSN surveillance definition change



See also: **Appendix G**

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In 2015, there were 42% fewer CAUTIs in Virginia hospitals than predicted based on the 2009 baseline.

22% of hospitals reported zero CAUTIS and 35% experienced a significant reduction from the national baseline.

Overall there was decrease in the number of CAUTIs observed and the SIR in 2015. However, this decrease may be attributed to the change in the definition. Surveillance definitions directly affect the reported number of infections and subsequently the SIR calculation. Because the 2015 CAUTI definition excludes urine cultures that are positive for yeast and other non-bacterial pathogens the number of CAUTIs reported from hospitals in 2015 and for forward may be lower than in previous years.

For more historical CAUTI data see Appendix G.



Surgical Site Infections

Colon & Abdominal Hysterectomy Procedures



Next we have surgical site infections.

Methods: SSI

- Reporting Requirements:
 - Inpatient Colon Procedures: January 2012
 - Inpatient Abdominal Hysterectomies: January 2012
- NHSN Baseline: 2006-2008
- SSI SIRs are presented using the CDC Complex Admission/Readmission (A/R) model

Complex A/R SSI Model	Complex 30-day SSI Model
Used by CDC for annual progress reports	Used by CMS IQR program
SSIs identified on admission/readmission to hospital where procedure was performed	SSIs with event date 30 days after the procedure
Multiple risk adjustment variables (page 14)	Only adjusts for age and ASA score
Results (pages 42-51)	Appendix I (pages 113-123)

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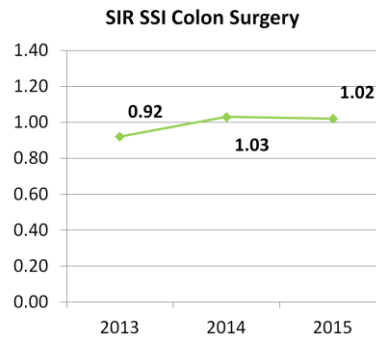
According to the VDH reporting requirements, hospitals are required to report SSI data following inpatient colon procedure and abdominal hysterectomies going back to 2012. The national baseline for SSIs is 2006 to 2008.

In this report, SSI SIRs are presented using the CDC Complex Admission/Readmission or A/R model. The A/R model includes SSIs identified on admission or readmission to hospital where the original procedure was performed. It is used by CDC for their annual progress reports.

Hospitals may be more familiar with the Complex 30-day model, which is used by the CMS Inpatient quality reporting program. For easy comparison, we have also included SSI SIR data presented using the 30-day model in Appendix I of the healthcare provider report.

Results: SSIs – Colon Procedures

- 77 hospitals performed colon procedures in 2015
- In 2015, there were about the same number of SSIs following colon surgeries in Virginia hospitals compared to the baseline
- SIR was 1.02 (95% CI: 0.90, 1.16)



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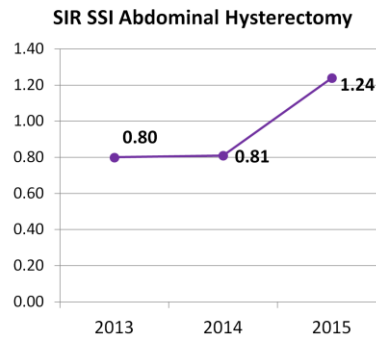
77 Virginia hospitals reported performing colon procedures in 2015.

In 2015, there were about the same number of SSIs following colon procedures as predicted based on the 2006-2008 baseline.

32 or 41% of Virginia hospitals reported zero SSIs following colon procedures.

Results: SSIs – Abdominal Hysterectomies

- 68 hospitals performed abdominal hysterectomies in 2015
- In 2015, there were 24% more SSIs following abdominal hysterectomies than predicted
- SIR was 1.24 (95% CI: 1.00, 1.53)



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Looking at abdominal hysterectomies.


68 hospitals reported performing abdominal hysterectomies in 2015.

Overall there was an increase in the abdominal hysterectomy SIR. There were 24% more SSIs than predicted based on the 2006-2008 baseline.



Laboratory-Identified Events (LabID)

Methicillin Resistant *Staphylococcus aureus* (MRSA) Bacteremia
& *Clostridium difficile* Infections



Moving on to Laboratory-Identified Events



Methods: LabID Events



- Reporting Requirements:
 - MRSA bacteremia and *Clostridium difficile* LabID events: January 2013
 - All facility-wide inpatients (including emergency department and 24-hour observation)
- NHSN Baseline: 2010-2011
- SIRs calculated for inpatient facility-wide hospital-onset events (on or after day 4)
- LabID events from rehab wards and behavioral health units that have CCN different from the hospital are excluded
- SIR calculations exclude months where patient days and/or admissions are missing
- *C. difficile* LabID events:
 - SIRs exclude data from units that serve infants (e.g., NICUs, labor & delivery)
 - SIRs exclude quarters where laboratory test method is missing

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According to the VDH reporting requirements, hospitals are required to report MRSA bacteremia and *Clostridium difficile* laboratory-identified events going back to 2013. This includes data for all facility-wide inpatients or FacWideIN, including emergency departments and 24-hour observation.

The NHSN baseline is from 2010 to 2011. SIRs are calculated for FacWideIN hospital-onset events that occur more than 3 days after admission. MRSA and *C. diff* LabID events reported from rehabilitation wards and behavioral health or psychiatric units that have a CMS certification number different from the hospital were excluded from the analysis. SIR calculations also excluded months where patient days and/or admission were missing.

Specifically to *C. diff*, SIR calculations excluded data from units that serve infants such as NICUs, well-baby clinics, and labor-delivery units. Quarters where laboratory test method data were missing are also excluded from the calculations.



Methods: LabID Events (cont.)



- If community-onset prevalence rates exceed a certain value for a quarter, the number of predicted infections and SIR will not be calculated:
 - > 1.78 for *C. difficile*
 - > 0.88 for MRSA bacteremia
 - See 'Months Included' column
- LabID Events
 - Allows laboratory testing data to be used without clinical evaluation of the patient
 - Used by CMS for quality reporting programs
 - Standardized and consistent method of collecting and reporting CDI and MRSA data
 - CDI rates tend to be higher when using LabID compared to clinical case definitions

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If a community-onset prevalence rates exceeds 1.78 for a quarter then the number of predicted infections and SIR was not calculated. You can see the number of months of reported data that were counted for your hospital in the “Months Included” column of the labID event tables.

There are a number of benefits to using labID data for surveillance. LabID event reporting allows laboratory testing data to be used without clinical evaluation of the patient. Because it does not rely on interpretation by providers it offers a more consistent and standardized method of collecting and reporting surveillance data. The SIR also adjusts for CDI test type to account for differences in sensitivity and specificity. Furthermore, labID events are used by CMS for quality reporting programs.

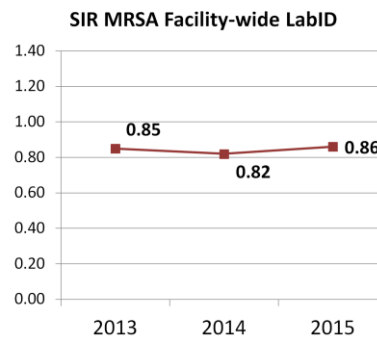
However there are also some caveats. For example, experience in other states have shown that CDI rates tend to be higher when using labID event data compared to clinical case definitions. Reasons for this may include differences in how individual hospitals define and classify clinical disease, and timing of specimen collection.

For further information about labID event data see the labID section under the risk adjustment and data exclusion sections in the methods of the report.



Results: MRSA

- In 2015, 14% fewer MRSA bacteremia LabID events were reported than predicted
- SIR was 0.86 (95% CI: 0.74, 0.99)
- 46% of Virginia hospitals reported zero MRSA bacteremia LabID events in 2015



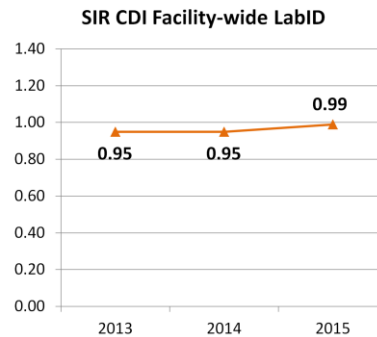
33

In 2015, there were 14% fewer hospital-onset MRSA bacteremia labID events in Virginia hospitals than predicted based on the 2010-2011 baseline.
37 hospitals or 46% reported zero MRSA bacteremia labID events in 2015.

Results: *C. difficile* Infection



- In 2015, there were about the same number of *C.difficile* labID events than predicted in Virginia hospitals
- SIR was 0.99 (95% CI: 0.96, 1.03)
- 11% of Virginia hospitals reported zero CDI LabID events



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For *C.Diff*, there were about the same number of C.Diff labID events as predicted in Virginia hospitals. However 11% of hospitals reported zero CDI labID events in 2015.



Healthcare Personnel Influenza Vaccination

2014-2015 Season



Finally we are going to talk about healthcare worker flu vaccination percentages in Virginia hospitals.

Methods: Flu Vaccination

- 2014-2015 Flu Season (October 1, 2014 – March 31, 2015)
- Shows the percentage of all healthcare workers who received the flu vaccination in each hospital
- Compares vaccination percentage to the **HHS Healthy People 2020** goal of 90.0%
 - <https://www.healthypeople.gov/2020/topics-objectives/topic/immunization-and-infectious-diseases/objectives>
- Healthcare workers are defined as employees, licensed independent practitioners (LIPs), and adult students/trainees and volunteers. Excludes all contract personnel.
- % healthcare workers vaccinated = $\frac{\text{number vaccinated (across all hospitals)}}{\text{total workers (across all hospitals)}} \times 100$

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The healthcare worker influenza vaccination data shows the percentage of healthcare workers who were vaccinated during the 2014-2015 season. Which is from October 1st 2014 to March 31st 2015. Hospitals are required to report data for healthcare workers in inpatient and outpatient departments. Healthcare workers are defined as employees, licensed independent practitioners and adult students or trainees. Contract personnel are excluded from all categories.

In this report we determine whether a hospital had a higher, lower or similar percentage of vaccinated workers compared to the HHS Health People 2020 goal of 90%.

The overall vaccination percentage for all Virginia hospitals was calculated using pooled means. This basically means that we summed the number of vaccinated workers across all hospitals and divided it by the sum of the total number of workers across all hospitals.

Reading Guide for the Influenza Vaccination Table

Percentage of healthcare personnel for each hospital that received the influenza vaccination (includes employees, licensed independent practitioners, students and volunteers)

Statewide aggregate data are found in the first row of each page.

Hospital Name	Percentage of All Hospital Workers Vaccinated	Comparison P-value ^a	How Does This Hospital Compare to the Healthy People 2020 Goal? ^b
All Virginia Hospitals	87.5%	0.038	✗ Worse
Hospital A	93.0%	0.024	★ Better
Hospital B	75.5%	0.001	✗ Worse
Hospital C	90.0%	0.132	= Same
Hospital D	91.5%	0.043	★ Better

*The 2014-2015 flu season was from October 1, 2014 – March 31, 2015.
^ap-value ≤ 0.05 is considered statistically significant.
^bThe Healthy People 2020 goal for healthcare worker vaccination in the United States is 90%. For more information about the healthcare worker vaccination goal, see [Appendix B](#).

Example: Hospital B

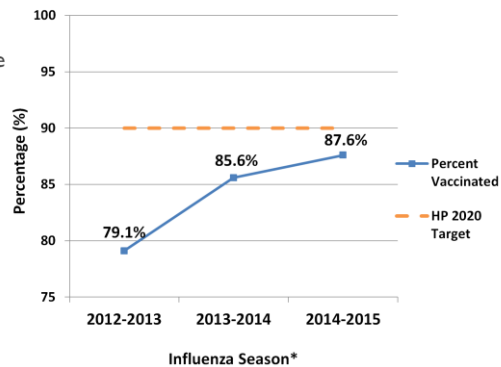
Percent Vaccinated	P-value	Healthy People 2020 Goal
75.5%	0.001	✗ Worse

- 75.5% received influenza vaccination during this flu season.
- Did not reach Healthy People 2020 Goal (90%)
- Hospital B's vaccination percentage was significantly lower than Health People 2020 Goal (p-value <0.05).

This slide is a screen shot of the Flu vaccination table reading guide. As you can see tables include the percent vaccinated for each hospital, the p-value and a comparison to the Healthy people 2020 goal.

Results: Flu Vaccination

- The 2014-2015 overall percentage was significantly lower than the HP 2020 goal
- The healthcare worker vaccination percentage for all Virginia hospitals was 87.6%
- 52% of Virginia hospitals met or exceeded the HP 2020 goal



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The 2014-2015 overall healthcare worker vaccination percentage for Virginia was 87.6%, which was significantly lower than the Healthy People 2020 goal. 42 hospitals or 52% met or exceeded the goal.

Overall Findings

In 2015 Virginia hospitals had:

Fewer (better)

- Central line-associated bloodstream infections (CLABSIs)
- Catheter-associated urinary tract infections (CAUTIs)*
- Methicillin-resistant *Staphylococcus aureus* (MRSA) bacteremia LabID events

* 2015 surveillance definition change

More (worse)

- Surgical site infections (SSIs) following abdominal hysterectomies

About the Same

- Surgical site infections (SSIs) following colon surgeries
- *Clostridium difficile* LabID events

- 87.6% of healthcare workers in Virginia hospitals received the influenza vaccination for the 2014-2015 flu season

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This slide summarizes the Executive Summary, and all the data that was just reviewed with you.

In 2015, Virginia hospitals had fewer number of CLABSIs, CAUTIs and MRSA bacteremia LabID events than predicted based on the national baseline.

Virginia hospitals reported about the same number of surgical site infections following colon surgeries as well as *Clostridium difficile* LabID events in 2015 compared to the national baseline data.

However, in 2015 there were more surgical site infections following abdominal hysterectomies than predicted based on the national baseline.

For the 2014-2015 flu season, 87.6% of healthcare workers in Virginia hospitals received the influenza vaccination.

Conclusions

- Hospitals in Virginia have made improvements in HAIs, but we **still have work to do**

Priorities:

- *C. difficile* infections
 - Antibiotic stewardship
- Healthcare worker flu vaccination
- Abdominal hysterectomies

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So, if we had to summarize 124 pages in one sentence, it would be that hospitals in Virginia have been working hard to make improvements in HAIs, but that we still have work to do.

C diff infections remain a priority statewide, and a lot of time and resources are now being paid to antibiotic stewardship.

We feel like we should be able to reach the Healthy People 2020 goal of 90% of healthcare workers vaccinated for influenza, and we will need everyone's help to get there. We also know, without really having data to support it, that we have a long way to go in vaccinating healthcare workers against flu in settings outside of acute care, for example in long-term care facilities.

One thing this report brought to light that we haven't been talking about at the statewide level is SSIs following abdominal hysterectomies. Further action is obviously needed, and we would like to discuss this with our hospital colleagues. Please reach out to us if you have ideas about factors that might be contributing to those SSIs, or ideas to fix the problem.



Report Promotion



Now for promotion and dissemination plans.

Timeline

- Preview period for IPs, partner organizations:
October 13 – 26
 - Send comments or questions to Sarah by:
COB Wednesday, October 26th
- Release date: **Monday, November 14th**
 - Get Smart Week: **November 14 – 18**

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All the hospital IPs received a copy of the healthcare provider report last week, and we have received some feedback and questions from some of you. Thank you for reading the report and reviewing your data for accuracy! Please send feedback to me by COB Oct 26. After that date we will be finalizing the report.

Report Release and Promotion

- Report release: Monday, November 14 (both versions)

Dissemination methods:

- VDH website
- Press conference with partner agencies
 - Get Smart Week November 14 – 18
- Press release
- Social media VDH accounts (Facebook, LinkedIn)
- Emailing it out to all hospital IPs, local health districts, partner agencies
- VDH HAI Newsletter

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The report is slated to be released Monday, November 14th. There will be a new page on our VDH website that will house the report, and we will share that link with you when it's ready.

There will be a multi-agency press conference on Nov 14 to kick-off Get Smart Week and highlight statewide efforts around antibiotic stewardship.

Resources (for you)

- VDH HAI annual report web page
- Executive summaries (providers, consumers)
- Fact sheets (providers, consumers): report **appendices**, webpages
- FAQs (providers, consumers)
- Slides with speaker notes
 - Webinar recording
- Get Smart Week resources:

<https://www.cdc.gov/getsmart/week/>

Available: Week of November 7

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We have been developing resources for you to use to answer questions about the report, both in the hospital setting and in the community setting at the district health departments.

As we've tried to highlight, there are also a lot of resources contained within the reports themselves.

The week before the report release, we will be sharing FAQs and talking points with you, as well as the slides and recording of this presentation.

We would encourage you to check out all the resources on the CDC Get Smart website and use those resources during Get Smart Week.



Frequently Asked Questions (FAQs)



Now I am going to go over some questions that we are frequently asked.

FAQs

Q. My facility entered 6 HYST SSIs but I only see 3. Why?

A. In this report, we use the Complex Admission/Readmission Model for SIRs. This model only includes SSIs identified during admission or readmission to the facility where the procedure was performed.

For SSI data using the 30-Day Complex Model, see **Appendix I**. That is the model used for CMS reporting.

For further explanation: See slide 27.

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Only deep incisional primary and organ/space infections detected during the same admission as the surgical procedure or upon readmission to the same hospital that performed the surgical procedure are included in the reported SIR. Superficial incisional primary (SIP), superficial incisional secondary (SIS) and deep incisional secondary (DIS) SSIs, as well as any SSI identified on post discharge surveillance, are excluded. The model only includes procedures and associated SSIs that were reported with primary closure technique. Because of this SSI numbers may be different depending on which model you use.

FAQs

Q. This report shows 22 LabID events but I entered 30 for 2015Q1. Why?

A. The LabID SIR includes healthcare-onset events only (i.e., specimen was collected on or after day 4 of admission). For MRSA, only blood specimens are included.

If you entered an event that was within 14 days of another event for the same location and the same patient, it is not included in the SIR, but may still appear on your line list.

For more information, use indicator variables when running the LabID line list in NHSN.

FAQs

Q. Why is my hospital listed as having “No Conclusion”?

A. If the number of predicted infections is less than 1.0, an SIR will not be calculated because the number of device days or surgical procedures is too low to calculate a precise SIR.

It does not mean a hospital failed to report data; it only means that during the specified time period, the number of patients, devices, and/or procedures that were seen at this hospital did not meet the minimum value for calculating an SIR (minimum precision criteria).

FAQs

Q. My hospital reported only one infection but it was listed as “Same”. Shouldn’t we receive a star or be doing “better”?

A. The interpretation is based on the statistical significance of the SIR. Even if your hospital observed less than 1 infection, if the SIR confidence interval is not significant (crosses 1.0) then your hospital will be listed as “same”.

Hospital A:

Observed	Predicted	SIR	95% CI	Interpretation
1.0	4.91	0.20	(0.01, 1.01)	= Same

Hospital B:

Observed	Predicted	SIR	95% CI	Interpretation
1.0	4.91	0.20	(0.01, 0.35)	★ Better

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The 95% CI is a range of values used to describe statistical significance when reporting the SIR. There is a high degree of confidence (in this case, 95%) that the true SIR lies within this range. The upper and lower limits are used to determine the significance and precision of the SIR. If the confidence interval includes the value of 1, then the SIR is *not significant* (i.e., the number of observed events is not significantly different than the number predicted). If the confidence interval does not include the value of 1, then the SIR is *significant*.

FAQs

Q. The healthcare worker influenza vaccination percentage for my hospital was 91.0%, which is better than the Healthy People 2020 goal of 90%. However, it was listed as “Same”. Shouldn’t we receive a star or be listed as doing “Better”?

A. The comparison to the Healthy People 2020 goal is based on the statistical significance of the percentage of workers vaccinated for each hospital. Statistical significance is determined using p-values for flu vaccination. Even if your hospital did better than the goal, if the p-value is not significant (>0.05) then your hospital will be listed as “Same”.

Hospital	Percent Vaccinated	P-Value	Interpretation
A	91.0%	0.31	= Same
B	91.0%	0.001	★ Better

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For healthcare personnel influenza vaccination rates, the p-value is used to compare the observed vaccination percentage to the Healthy People 2020 goal (90%)⁵. If the p-value is less than or equal to 0.05, we can conclude that the hospital vaccination percentage is significantly different than the 90% goal. If the p-value is greater than 0.05, we can conclude that the hospital vaccination percentage is not statistically different than 90%.

FAQs

Q. Why is half of my confidence interval missing?

A. When the SIR is zero (0), the lower bound of the 95% confidence interval cannot be calculated. However, for ease of interpretation, the lower bound of the confidence interval can be considered 0.

Observed	Predicted	SIR	95% CI	Interpretation
0	3.46	0.00	(., 0.89)	★ Better
0	2.21	0.00	(., 1.36)	= Same

Thinking ahead: 2016 Annual Report

National NHSN Rebaseline Project

- Live in NHSN December 10
- New baselines based on national 2015 data
- New models, including some new variables considered for risk-adjustment
- Separate models for acute and critical access hospitals

What does that mean?

- Hospital SIRs will be different because number of predicted infections will change

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As you know, the NHSN rebaseline updates are set to go live in the system this December. The rebaseline project is updating both the national baseline, and the models used for risk-adjustment of the data.

This means that we will all have a lot to learn in a couple months, that the data will likely look worse because the baselines have been updated to more recent performance, and that this report will also look different next year. For example, critical access and acute care hospitals will now have different models, thus we will be benchmarking them separately and not together.

We would encourage everyone to watch the next NHSN webinar about the rebaseline on November 30.

Update: Regulations for Disease Reporting

- Updated Virginia Regulations for Disease Reporting and Control
- Effective October 20, 2016
- <http://www.vdh.virginia.gov/content/uploads/sites/13/2016/03/Virginia-Reportable-Disease-List-October-2016.pdf>
- Invasive *Staphylococcus aureus*, methicillin-resistant infections (MRSA) were removed from the reportable disease list
- Still reportable as LabID MRSA bacteremia via NHSN
- <http://www.vdh.virginia.gov/home/resources-for-health-care-professionals/updates-to-the-regulations-for-disease-reporting/>

VIRGINIA REPORTABLE DISEASE LIST	
<p>Reporting of the following diseases is required by state law (Sections 32-1.08 and 32-1.27 of the Code of Virginia and 12 VAC 5-84-80 and 12 VAC 5-84-81) of the Board of Health Regulations for Disease Reporting and Control. http://www.vdh.virginia.gov/content/uploads/sites/13/2016/03/Virginia-Reportable-Disease-List-October-2016.pdf. Report all conditions when reported or confirmed to a local health department (LHD). Reporters may also report to the state health department (SHD) via the http://www.vdh.virginia.gov/content/uploads/sites/13/2016/03/Virginia-Reportable-Disease-List-October-2016.pdf. Report all conditions when reported or confirmed to a local health department (LHD). Reporters may also report to the state health department (SHD) via the http://www.vdh.virginia.gov/content/uploads/sites/13/2016/03/Virginia-Reportable-Disease-List-October-2016.pdf. Report all conditions when reported or confirmed to a local health department (LHD). Reporters may also report to the state health department (SHD) via the http://www.vdh.virginia.gov/content/uploads/sites/13/2016/03/Virginia-Reportable-Disease-List-October-2016.pdf.</p>	
REPORT IMMEDIATELY	REPORT WITHIN 3 DAYS
<p>Acute (1)</p> <p>Bacterial (2)</p> <p>Cholera (3)</p> <p>Communicable infection, severe (e.g., SARS-CoV, MERS-CoV) (4)</p> <p>Diphtheria (5)</p> <p>Disease caused by an agent that may have been used as a weapon (6)</p> <p>Immunoglobulin deficiency infection, invasive (7)</p> <p>Infectious mononucleosis (8)</p> <p>Influenza A, novel virus (9)</p> <p>Measles (rubeola) (10)</p> <p>Meningococcal disease (11)</p> <p>Scabies (12)</p> <p>Scarlet fever (13)</p> <p>Shigellosis (14)</p> <p>Staphylococcal infection, including cellulitis (15)</p> <p>Streptococcal (16)</p> <p>Typhoid (17)</p> <p>Typhoid, paratyphoid and enteric (18)</p> <p>Typhoid, paratyphoid and enteric (19)</p> <p>Typhoid, paratyphoid and enteric (20)</p> <p>Typhoid, paratyphoid and enteric (21)</p> <p>Typhoid, paratyphoid and enteric (22)</p> <p>Typhoid, paratyphoid and enteric (23)</p> <p>Typhoid, paratyphoid and enteric (24)</p> <p>Typhoid, paratyphoid and enteric (25)</p> <p>Typhoid, paratyphoid and enteric (26)</p> 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<p>Typhoid, paratyphoid and enteric (63)</p> <p>Typhoid, paratyphoid and enteric (64)</p> <p>Typhoid, paratyphoid and enteric (65)</p> <p>Typhoid, paratyphoid and enteric (66)</p> <p>Typhoid, paratyphoid and enteric (67)</p> <p>Typhoid, paratyphoid and enteric (68)</p> <p>Typhoid, paratyphoid and enteric (69)</p> <p>Typhoid, paratyphoid and enteric (70)</p> <p>Typhoid, paratyphoid and enteric (71)</p> <p>Typhoid, paratyphoid and enteric (72)</p> <p>Typhoid, paratyphoid and enteric (73)</p> <p>Typhoid, paratyphoid and enteric (74)</p> <p>Typhoid, paratyphoid and enteric (75)</p> <p>Typhoid, paratyphoid and enteric (76)</p> <p>Typhoid, paratyphoid and enteric (77)</p> <p>Typhoid, paratyphoid and enteric (78)</p> <p>Typhoid, paratyphoid and enteric (79)</p> <p>Typhoid, paratyphoid and enteric (80)</p> <p>Typhoid, paratyphoid and enteric (81)</p> <p>Typhoid, paratyphoid and enteric (82)</p> <p>Typhoid, paratyphoid and enteric (83)</p> <p>Typhoid, paratyphoid and enteric (84)</p> 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While we have a captive audience, we wanted to point out that effective yesterday, the Virginia Regulations for Disease Reporting and Control have been updated. MRSA was removed from the reportable disease list, however, as you know, hospital-onset LabID MRSA bacteremia is still reportable to VDH via NHSN. We get better, more consistent MRSA data through NHSN, therefore, there was no longer a need to also have you send in MRSA disease reports.

Acknowledgments = Thanks!



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There are a lot of people who contributed to the collection of the data found in this report, and we especially want to thank all the hospital infection preventionists who work hard every day to facilitate the collection and reporting of HAI data.

We also want to thank Andrea Alvarez, our former HAI Program Coordinator, and one of the co-authors of this report.

Finally, we want to thank our partner organizations, the CSTE workgroup who standardized HAI reporting, and our colleagues at the TN Dept of Health.

Questions?

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